TITLE MOTOR ASSEMBLY VIBRATOR 1.3V 9000 RPM

Issue O ES7359 5-1-96 Brian Hassemer	Issue A ES7508 6-20-96 David McCutcheon	Issue B ES7776 9-20-96 Brian Hassemer Add 2nd source for D02
Issue C ES7962 11-14-96 A. Grossman/B Michalak Added P/N D04	Issue D ES8117 01-10-97 A Grossman/B Michalak Changed length and tolerance of wires for D04	Issue E ES9276 4-28-98 Kwun-Heng Ho/Chris Carlson Added P/N D05
Issue F ES9634 07-06-98 Nick Guyot Added C.I.Kasei and Monnex for D03 and Revised its Mechanical Layout.	Issue G ES9665 10-29-98 Nick Guyot Corrected errors found in Issue F	Issue H ES10020 12-08-98 Walter Scheffrahn Corrected Temp degree errors at 5.2, 5.3, and 7.2
Issue J ES10064 01-04-99 Gary Belano Added Dooco Electronic USA For D03	Issue K ES9678 02-11-99 Dave Fliszar Added D06	

1. PURPOSE AND SCOPE

This document contains both general Motorola requirements, qualification requirements, and those specific electrical and mechanical requirements for this part.

2. DESCRIPTION AND APPLICATION

2.1 DESCRIPTION: The motor and assembly described is a miniature DC electric motor with a counter weight attached to the shaft.

2.2 APPLICATION: It is used as a silent vibrator alert for portable telephones.

3. APPLICABLE DOCUMENTS

12M80967A78	Motorola Inc. Supplier Material Quality Control
12S10601A	Packaging Rules for Suppliers
12S11055A	Supplier Quality Assurance Program
12S11062A	Supplier Quality Certification Program
12S13116J	Solderability Tests For Hand Soldering
EIA-STD-556	Outer Shipping Container Bar Code Label Standard
12M06019A87	Product Dust Test

4. APPROVED SOURCES

Part Number:	Supplier:	Supplier Part Number:
59R09127D01	Epson	EPC-04-20
59R09127D02	Epson	EPC-04-20 (MTR-1)
	C.I. KASEI	A4B-03-WB
59R09127D03	Epson	EPC-04-20 (MTR-2)
	Monnex	PGR-042A3
	C.I. KASEI	A4B-03-WB-03
	DooCo	CY04F01H

Part Number:	Supplier:	Supplier Part Number:
59R09127D04	Epson	EPC-040-20 (MTR-3)
59R09127D05	Epson	EPC-040-20 (MTR-4)
59R09127D06	Epson	EPC-040-20 (MTR-7)

5. COMPONENT REQUIREMENTS

5.1 CRITICAL PARAMETER SUMMARY

5.1.1 Load Current: Per Section 5.3.2

5.1.2 Spot Weld Strength: Per Section 5.4.7

5.2 GENERAL REQUIREMENTS

5.2.1 Quality: For component qualification: These parts shall exhibit an escaping defect rate of 250 parts per million (PPM) or less.

5.2.2 Operating Temperature Range: 10°C to -50°C

5.2.3 Storage Temperature Range: 40°C to -65°C

5.3 ELECTRICAL REQUIREMENTS (@ Ta=25°C ± 2°C unless specified)

5.3.1 Operating Voltage: 1.3 Volts Nominal

[X] 5.3.2 Load Current (@ 1.3 v) Maximum: 85 mA

5.3.3 Load Speed (@ 1.3 v): 9000 RPM ± 2000

5.3.4 Armature Resistance: 13 Ohms ± 20%

5.3.5 Starting Load Voltage (Maximum): 0.9 Volts

5.4 MECHANICAL REQUIREMENTS

5.4.1 Counterweight: Tungsten alloy of specific gravity of 16.0 minimum. Finish of electroless nickel of 2 to 4 microns thick. Corrosion resistance of salt spray test for 24 hours.

5.4.2 Brush and commutator materials: All brush and commutator materials must have gold alloy on all contact surfaces

5.4.3 Motor housing: Carbon steel (SPCE-SB). Electroless nickel plate, 4 to 8 microns.

5.4.4 Shaft Play: Total shaft play shall be 0.012 inches maximum axially toward the counterweight.

5.4.5 Polarity: Red wire shall be positive lead and blue wire shall be negative lead.

5.4.6 Motor assembly configuration: See Figure 1 on page 8.

[X] 5.4.7 Spot Weld Strength: Bracket spot weld to withstand 5 kg minimum. (Where applicable)

5.5 MOTOROLA PROCESS PARAMETERS

(All components must fully conform to electrical and mechanical specifications in Sections 5.3 and 5.4. after exposure to process parameters in the order listed below).

5.5.1 Solder Systems

The parts shall withstand the following conditions with no degradation in performance.

Hand Soldering: Must conform to Motorola Standard 12S131158, Class C.

Immerse component leads in RMA flux up to the height of typical solder wetting. Expose to solder heat to 299 8C for 10 seconds. Freon or Terpene cleaning not allowed on motors.

5.6 SOLDERABILITY

5.6.1 Component Termination Solderability Test

Leads shall be twisted or flexed configuration and tinned. Solderability of leads or flex with the use of a hand soldering iron with a tip temperature of 2968C ± 58C. Leads cleaned with Alpha 100 flux. Dip into solder containing 63/37 molten tin/lead alloy for 5 seconds + 1 second, - 0 seconds. Withdraw and clean with freon or alcohol. Wetting shall exceed 95% coverage.

6. SUPPLIER REQUIREMENTS

6.1 EXCEPTIONS

Any supplier exceptions to this specification for any reason must be documented by special waiver supplied by the Motorola Cellular Purchasing Department and approved by the Motorola Cellular Development Engineering and Quality Departments.

6.2 CHANGES

No change shall be allowed on production material, process, or manufacturing location, regardless of whether such changes affect characteristics specified, without prior explicit written approval from Motorola's Cellular Development Engineering and Purchasing Departments. Refer to Supplier Request for Engineering Change Approval document 3976-99.

6.3 QUALITY CONTROL REQUIREMENTS

6.3.1 Statistical process control data submission requirements are as required per Motorola Supplier Material Quality Control Specification 12M60957A78. Critical parameters are denoted by the symbol "[X]". The statistical process control data for critical parameters shall be submitted with the part qualification procedure and again at any time at Motorola's request. Motorola may add critical parameters later if the need arises.

6.3.2 The supplier and his subcontractors must establish and maintain a Quality Program

6.3.3 The supplier is expected to strive for Certified Part Number and Quality Certified Supplier status. Motorola Specification 12S11082A identifies and defines general guidelines, requirements, and performance levels needed to initiate, achieve, and maintain certification status.

6.4 SUPPLIER TEST REQUIREMENTS

Upon request by Motorola, the supplier shall include a "Certificate of Compliance" report for critical parameters with each production shipment as specified in 12M80967A78.

6.5 PACKAGING AND SHIPMENT

6.5.1 Components must be sealed and packaged prior to shipment so as to prevent contamination and damage while in route to Motorola. All intermediate packaging material shall be sulfur and chloride free to preserve solderability. Damaged containers will be documented by Motorola Receiving. Follow up action with carrier or supplier will occur if appropriate. Shipping containers shall comply with Motorola Standard 12S10801A and EIA-STD-556 Bar Coding Label requirements.

6.5.2 Any data should be correlated to the material received and be enclosed with the parts inside the packing container. When multiple packing containers are shipped as one lot, the container with the data should be marked "DATA IN THIS CONTAINER".

6.6 WARRANTY

The supplier shall comply with the warranty as specified on the Motorola Purchase Order. The warranty period will commence upon the date of receipt of the parts to Motorola. In the event that the warranty is not specified on the purchase order, the warranty period shall be one year from the date of delivery.

7. QUALITY TESTING PROVISIONS

7.1 QUALIFICATION REQUIREMENTS

Representative production samples shall meet the requirements per Motorola Specification 12M80967A78. All electrical and mechanical parameters identified by the symbol "[X]" require statistical quality control data. For qualification, this information must supplement the minimum test data requirements listed below.

7.2 QUALIFICATION TESTS

All components must conform to the following environmental test program shown in Section 7.4 which is detailed below. Part marking must remain legible after testing. Requirements are subject to verification at any time.

7.2.1 TEMPERATURE SHOCK: Each cycle consists of 2 hours at - 10°C followed by 2 hours at +60°C with a 20 second maximum transition time between temperature extremes. Test duration is 32 cycles.

7.2.2 STATIC HUMIDITY: Precondition at +25°C for 60 minutes. After 240 hours at +50°C with 90 to 95% relative humidity, allow to dry at room ambient for 4 hours.

7.2.3 TEMPERATURE CYCLING: Each cycle consists of 2 hours at - 10°C followed by 2 hours at +60°C at 90 % RH minimum for 140 hours in length. Continuously power cycle the motor with 8 seconds ON time followed by 52 second OFF time.

7.2.4 VIBRATION: Sinusoidal vibrate at 60 Hz for 30 minutes. The amplitude shall be 1.5 mm displacement.

7.2.5 MECHANICAL SHOCK: Consists of dropping the motor assembly attached to a 100 gram plastic housing onto a concrete floor from 1.2 meters in height. Drop twice in each of the three perpendicular planes (total of 6 impacts).

7.2.6 LEAD PULL TEST: The wire assembly must withstand a slow axial pull force to destruction of 1 lb minimum.

7.2.7 SHAFT PULL TEST: The counter weight must withstand a low axial pull force to destruction of 6.8 lbs minimum from the shaft. the shaft must withstand a low axial force to destruction of 3.4 lbs. minimum from the motor body.

7.2.8 SULFUR EXPOSURE: Place sulfur powder on the commutator, brush, case and bushing, counterweight, and shaft. Subject motor parts to 100°C for 48 hours. Examine the contact surfaces for corrosion.

7.2.9 LAS VEGAS EFFECT: Operation test in low humidity environmental exposure. Operate samples in 60°C environment under 20% maximum relative humidity for 48 hours. Continuously power cycle the motor with 8 seconds ON time followed by 52 second OFF time.

7.2.10 DUST: Subject units to 1140 Mesh Silica Flour by placing in a test chamber. Agitate the fine dust for 2 seconds and let settle for 15 minutes. Repeat the cycle for a duration of 4 hours. Retrieve test units from the chamber and shake off excess dust. All functional elements and parameters must be per specification

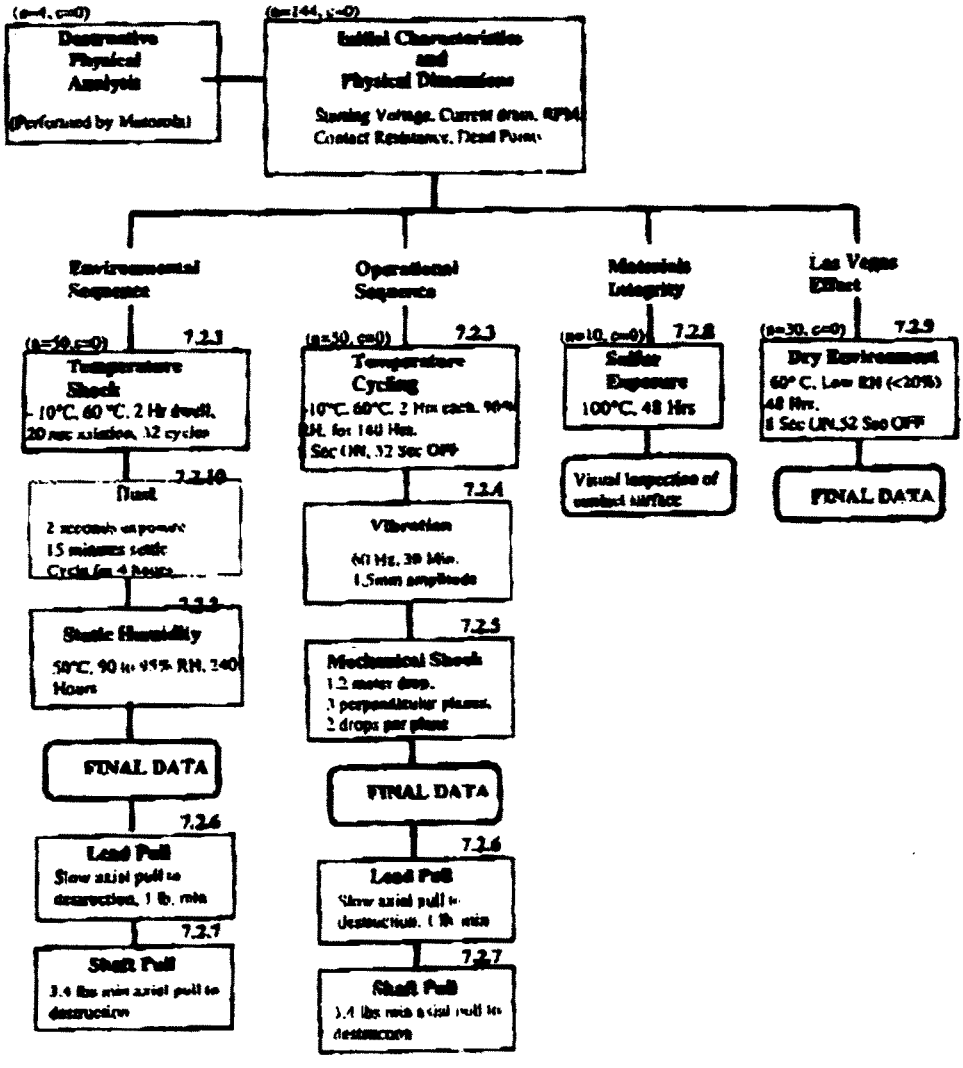
ALT Dust Test for the 58-08127D86 (MTR-4) must be done inside the radio plastic housing.

7.3 POST ENVIRONMENTAL

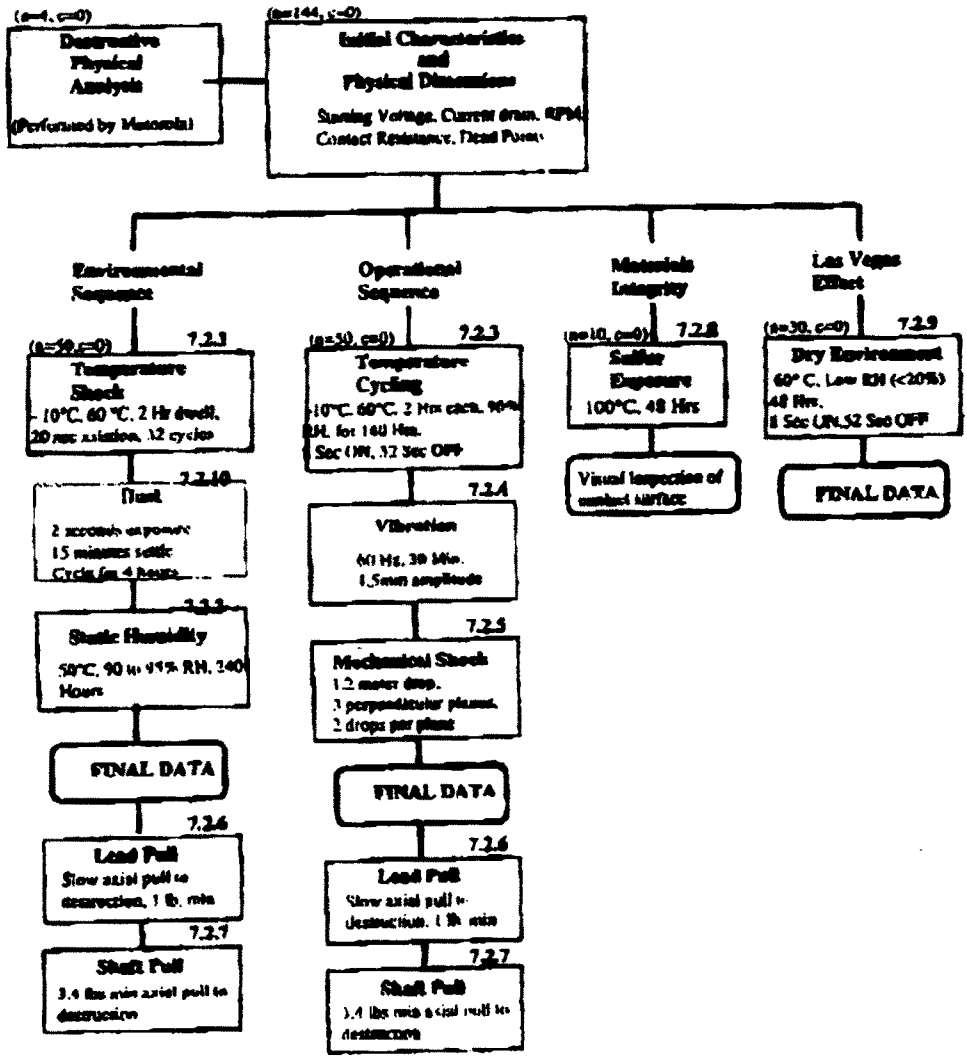
7.3.1 Electrical requirements to be as follows:
- Starting voltage: Motor operative at 0.9V.
- Current drain: Maximum + 10% of original readings.
- RPM: Minimum - 10% of original readings.
- Contact resistance: Within +/- 10% of original readings.

7.3.2 Integrity must not be compromised by qualification testing. Complete visual inspection will be performed before and after environmental testing.

7.4 QUALIFICATION FLOWCHART

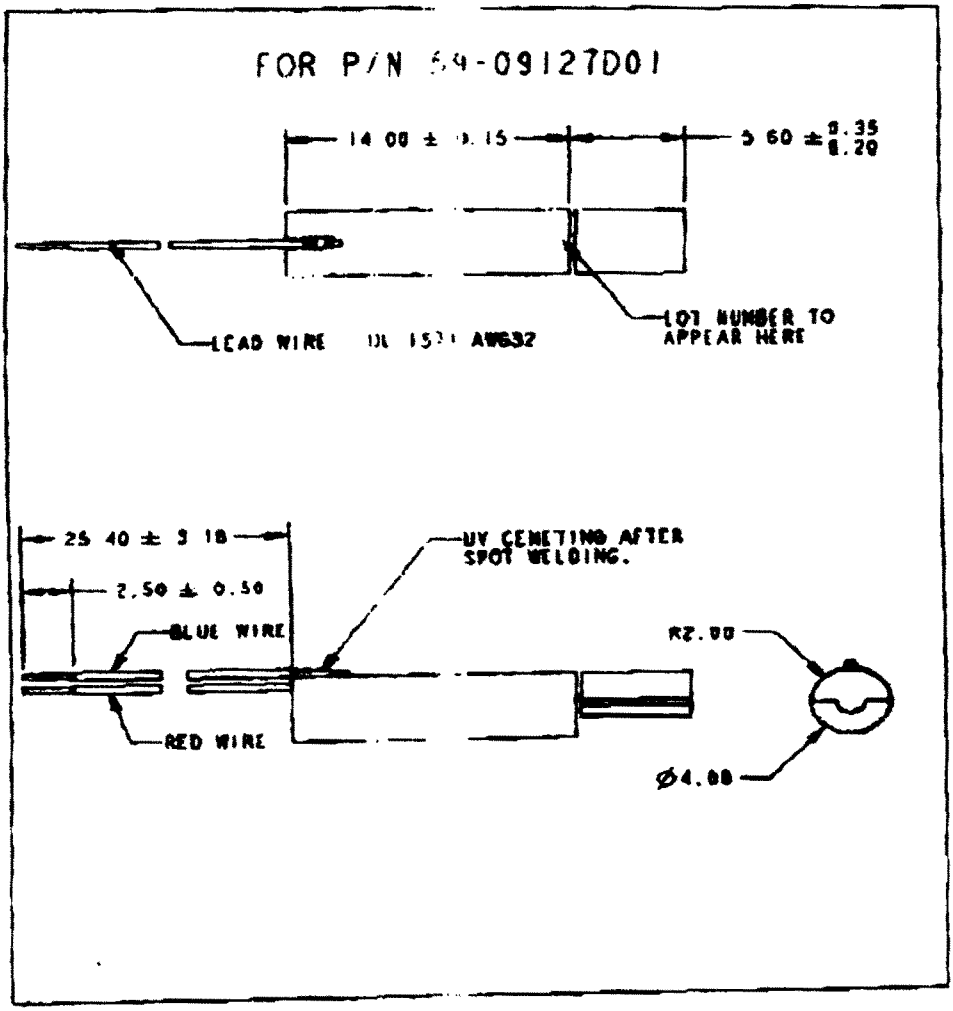


7.4 QUALIFICATION FLOWCHART

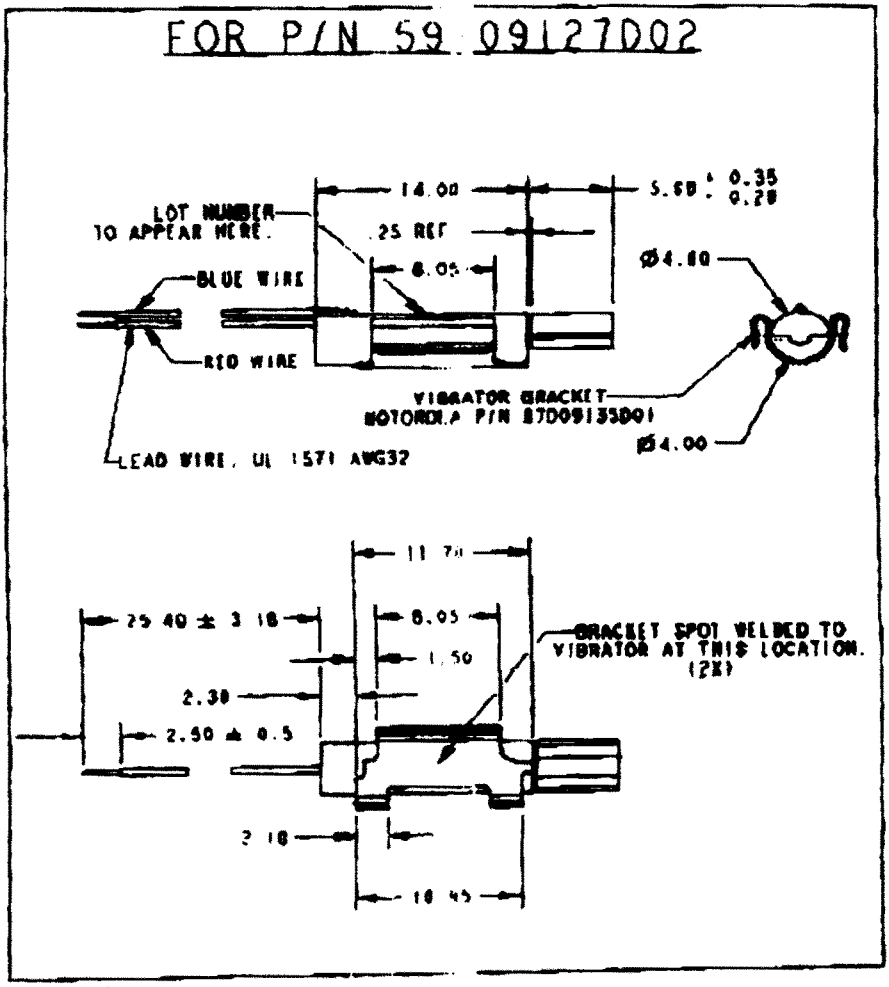


8. MECHANICAL LAYOUT

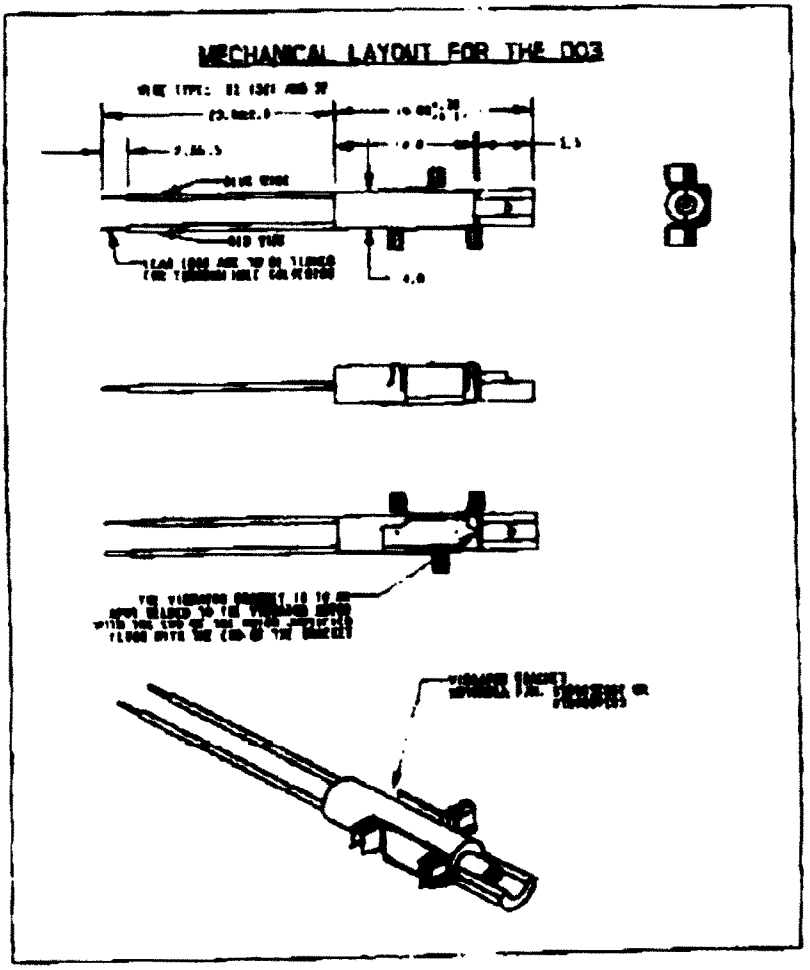
8.1 Mechanical layout for -D01



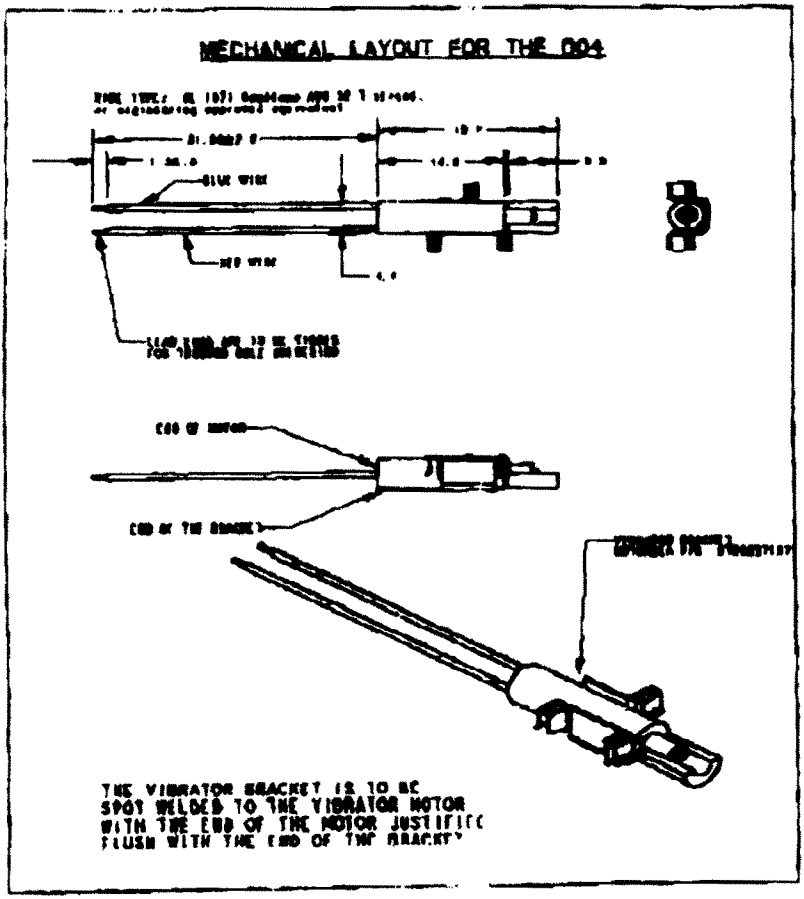
8.2 Mechanical layout for -D02



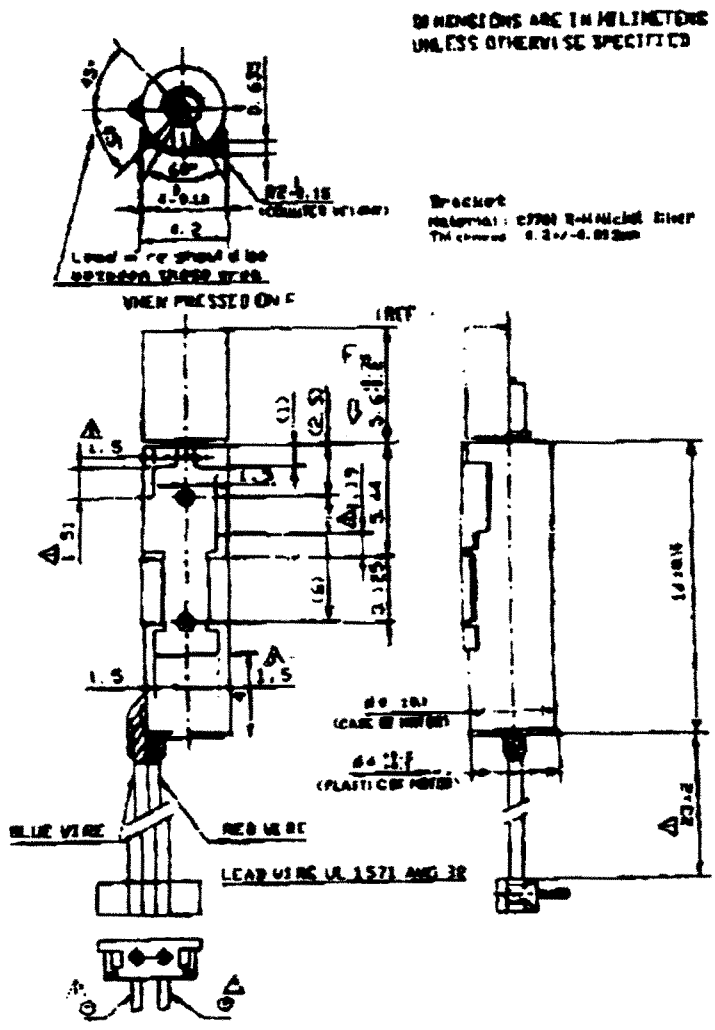
8.3 Mechanical layout for -D03



8.4 Mechanical layout for -D04

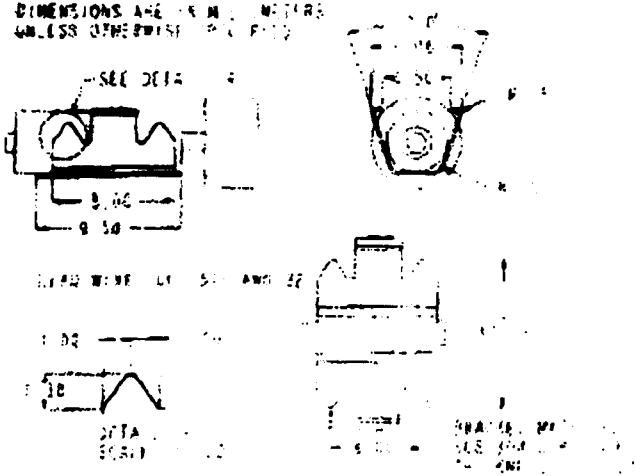

MECHANICAL LAYOUT FOR THE D04
BLUE WIRE
THE VIBRATOR BRACKET IS TO BE
SPOT WELDED TO THE VIBRATOR MOTOR
WITH THE END OF THE MOTOR JUSTIFIED
FLUSH WITH THE END OF THE BRACKET

8.5 *Mechanical layout for -006*



CONNECTOR	
CONTACT	71-6005-002
HOUSING	61-6005-002 (CLEAR)
MAKER	KYOCERA ELCO CORP

8.6 Mechanical Layout-D06



CONNECTORS

CONTACT	560589-1
HOUSING	560580-1
MAKER	AMP